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Costs and Practices of Selected Cooperatives in Operating Bulk-Feed Trucks

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by Thomas H. Camp

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Farmer Cooperative Service
U.S. Department of Agriculture
Washington, D.C., 20250

Joseph G. Knapp, Administrator

The Farmer Cooperative Service conducts research studies and service activities of assistance to farmers in connection with cooperatives engaged in marketing farm products, purchasing farm supplies, and supplying business services. The work of the Service relates to problems of management, organization, policies, merchandising, product quality, costs, efficiency, financing, and membership.

The Service publishes the results of such studies; confers and advises with officials of farmer cooperatives; and works with educational agencies, cooperatives, and others in the dissemination of information relating to cooperative principles and practices.

October 1965

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Highlights

Bulk-feed trucking operations of 7 selected farmer cooperatives (during 1963) are analyzed, operating costs examined, and more efficient practices suggested.

The cooperatives operated 110 bulk-feed trucks in fleets varying in size from 8 to 37 trucks. These trucks hauled more than half a million tons of bulk feed from 17 distribution points in 1963.

The major recommendations of the report are that cooperatives (1) maintain detailed records on the operating performance and costs of individual trucks, (2) dispatch trucks systematically, and (3) consider the features listed in the report when buying trucks.

The cooperatives used 14 sizes of bulk-feed trucks, ranging from 6 to 21 tons; three-fourths had a manufacturer's rated capacity of from 9 to 12 tons, averaging just over 11 tons. The 110 trucks traveled over 3 million miles in 1963, and delivered 535,391 tons of feed valued at almost $39 million. Total operating costs for this fleet, excluding administrative expenses, were more than $1.5 million, or about 48 cents a mile.

Total truck operating costs per ton of feed delivered ranged from $2.39 to a high of $7.09 and averaged $2.89. Four of the seven cooperatives, operating three-fourths of the 110 trucks, delivered feed at an average cost of $3 a ton or less.

Direct costs amounted to $2.28 a ton, or 79 percent of total operating costs. The remaining 61 cents a ton, or 21 percent, were overhead costs. Drivers' wages, were the largest expense item: $1.36 a ton, or 47 percent of direct costs. Of the direct costs, fuel, oil, and grease made up the second largest expense category, amounting to 42 cents a ton, followed by vehicle repairs and parts at 39 cents a ton.

Depreciation of motortrucks was the largest overhead cost item, amounting to 35 cents a ton, or 12 percent of total overhead costs. Taxes, licenses, and permits accounted for 14 cents a ton.

Backhauls were reported as available at only 5 of the 17 distribution points at which the bulk-feed trucks were located. At these five points, only 8 percent of the total trips had return loads. Nine out of ten of these backhauls consisted of lime, fertilizer, or feed ingredients.

Management personnel at the 17 bulk-feed distribution points operated by the 7 cooperatives reported time required to load and unload bulk feed depends to a large extent on kind of feed and type of loading or unloading equipment used. Factors influencing the unloading operation are length and height of pipe or chute and the number and locations of farm bulk bins to be filled.

"Low-hanging power lines" was the most frequently mentioned problem encountered in making bulk feed deliveries to patrons. "Temporary highway weight embargoes" was the second most frequently mentioned problem.

In planning to reduce operating costs, cooperatives should consider: Length of delivery trip, operating terrain, road conditions, size of load, type of feed, nature of loading and unloading facilities, and equipment to meet needs of customers.

Costs and Practices of Selected Cooperatives in Operating Bulk-Feed Trucks

by Thomas H. Camp

Transportation Branch
Management Services Division

This study was made in response to recommendations made to the U.S. Department of Agriculture by the Marketing Research Advisory Committee. It is the third phase of a study of motortruck operations and costs. These costs are needed to provide benchmarks for the guidance of cooperative managements in helping to increase efficiency in bulk-feed distribution and to reduce feed costs to patrons.

Farmer cooperatives operated a total of 6,400 feed-delivery trucks in 1959.[1] Of these, 4,412 were used for delivery of sacked feeds. Another 1,060 were operated as combination sacked- and bulk-feed delivery trucks; 928 were used exclusively for delivering bulk feed.

During 1959, over 2.9 million tons of feed were delivered in straight bulk form, and 267,000 tons were delivered to patrons in sacks and then transferred at the farm to the farmers' bulk bins. A total of 6.4 million tons of feed were delivered in trucks operated by cooperatives in 1959.

Scope and Method of Study

A list of cooperative associations operating bulk-feed trucks[2] was developed from information obtained in this Farmer Cooperative Service study.[1] Of 33 cooperatives operating bulk-feed trucks in 1959, only 9 cooperatives operated truck fleets of 10 or more. Interviews were made during the summer of 1964 and usable information on operating characteristics and costs was obtained from 7 of the 9 cooperatives. At the time of this study, 2 of the cooperatives were operating fewer than 10 trucks. Information obtained from these 7 cooperatives is the basis of findings reported here.[3] The data were obtained by personal interview.

Some cooperatives' records were kept on a divisional basis, therefore, the records were located in 10 States--North Carolina, Pennsylvania, New Jersey, New York, Massachusetts, Maine, Illinois, Washington, Oregon, and California.

[1] Gessner, Anne L. Integrated Feed Operations Through Farmer Cooperatives, 1959, Gen. Rept. 100, Farmer Cooperative Serv., U.S. Dept. Agr. April 1962.

[2] The term "truck" as used in this report refers to the chassis and body as a unit.

[3] Most were located near the east and west coasts and hauled mainly poultry and dairy feeds.

Number of Trucks Operated by Type, Capacity, and Age

The 7 cooperatives in this study operated 110 bulk-feed trucks in 1963. Seventy-three or two-thirds of these 110 trucks had manufacturers' rated capacities[4] of from 9 to 12 tons (table 1). A complete breakdown of trucks by capacity and number of body types is given in appendix table 15. The most popular trucks were the 12-ton size (38 trucks), and the 10-ton size (28 trucks).

Ninety-five of the 110 trucks had tank bodies. Of these, 34 had all-mechanical discharge systems. The next most popular discharge system of the tank bodies was "auger to air," with 25 trucks so equipped.

The average age of trucks in this study was 48 months. An indication of the trend to

[4] Refers to body rating.

Table 1.--Capacity and number of bulk-feed trucks operated by 7 cooperatives, by type of body, discharge system, and average age, 1963

Body type and discharge system	Manufacturer's rated capacity of trucks (tons)			Total	Average age
	Under 9	9 to 12	Over 12		
	Number			Number	Months
Tank:					
Belt to air	3	9	0	12	52
Auger to air	0	20	5	25	68
Auger to auger	3	3	2	8	25
Mechanical to air [1]	0	6	4	10	36
All mechanical	3	24	7	34	54
Mechanical to mechanical air	0	5	1	6	23
Total	9	67	19	95	--
Open top-tilt bed [2]					
Air	0	3	0	3	19
Auger to air	9	3	0	12	32
Total	9	6	0	15	--
Grand total	18	73	19	110	--
Average age, by capacity, in months	39	54	34	--	48

[1] Mechanical discharge system includes drag chain and paddle type.
[2] Canvas-covered.

larger trucks is shown by the average age according to size categories. The average age of trucks with capacity of over 12 tons was 34 months compared to 54 months for those with 9- to 12-ton capacities, and 39 months for those with under 9-ton capacities.

The original cost of these trucks ranged from $4,700 to $29,300 and averaged $13,229 per truck.

Table 2 shows the number of trucks operated by each cooperative studied and the average age of each fleet. Average ages of truck fleets ranged from 2 to over 7 years.

Table 2.--Average age of bulk-feed trucks operated by 7 cooperatives, 1963

Cooperative	Trucks in fleet	Average age	Percentage of total
	Number	Months	Percent
F	37	43	34
D	19	36	17
B	15	87	14
A	12	48	11
G	10	24	9
C	9	33	8
E	8	84	7
Total	110	48	100

Volume of Feed Delivered

Data on feed volume of the 7 regional cooperatives show they manufactured or handled almost a million tons (table 3). Of this volume, 64 percent was sold as bulk. Eighty-five percent of the bulk tonnage was delivered in trucks operated by the cooperatives. The amount of bulk feed hauled by individual cooperatives in their own trucks ranged from 39 to 100 percent of total bulk-feed sales.

The dollar value of feed transported by the cooperatives in this study was estimated to be almost $39 million in 1963, or about $355,000 per truck.[5]

Table 3.--Total feed handled, volume sold in bulk, and volume hauled in own bulk trucks, 7 cooperatives, 1963

Cooperative	Total feed handled	Volume sold as bulk		Volume of bulk feed transported in own trucks	
	Tons	Tons	Percent	Tons	Percent
F	346,000	258,660	75	258,660	100
G	225,834	33,875	15	22,244	66
D	116,006	99,308	86	75,871	76
B	84,102	74,852	89	74,852	100
C	78,025	48,882	63	19,193	39
E	73,472	65,087	89	37,369	57
A	59,000	51,390	87	47,202	92
Total	982,439	632,054	64	535,391	85

Analysis of Bulk-Feed Truck-Operating Costs

Data in this report are based on the analysis of cost-accounting records kept by 7 regional cooperatives on 110 bulk feed trucks.

In a previous FCS study,[6] a schedule was developed to obtain motortruck operating costs of farmer cooperatives on a uniform basis by cost groups. That schedule was used in this study but modified to exclude indirect or administrative costs that were applicable to the trucking operation.

The 7 cooperatives studied operated various types of trucking equipment in addition to bulk-feed trucks. Records kept on indirect or administrative costs did not permit segregating out those costs applicable to bulk-feed trucks only. A previous study[6] conducted by FCS of dry-freight, van-type trucks showed indirect costs averaged about 10 percent of total operating costs. This gives an indication of the re-

[5] Based on: U.S. Average Price of Formula Feed ($72.80) 1963 Poultry and Livestock Production, U.S. Bur. Census.

[6] Camp, Thomas H. Motortruck Operating Costs of Farmer Cooperatives Gen. Rpt. 121, Farmer Cooperative Serv., U.S. Dept. Agr., June 1964.

lationship of indirect to total operating costs and may be used as a general guideline for bulk feed truck operations.

Total Operating Costs

The 7 regional farmer cooperatives spent a total of $1,545,212 to deliver 535,391 tons of bulk feed in 1963 (appendix table 16). Total cost per delivered ton averaged $2.89, or about 48 cents a mile (table 4). A detailed breakdown of each cooperative's costs by major cost groupings is presented in appendix tables 17-23, to permit other cooperatives with like characteristics to measure performance records of their bulk-feed truck fleets with those shown.

Table 4.--Bulk feed truck operating costs by major cost groups, 7 cooperatives, 1963 [1]

Cost groups	Costs			
	Total	Per ton	Per mile	Percentage of total
	Dollars	Cents	Cents	Percent
Direct costs [2]	1,217,624	228	37.6	79
Overhead costs [3]	327,588	61	10.1	21
Total	1,545,212	289	47.7	100

[1] Does not include indirect or administrative costs for management, such as time spent in general administration of trucking operations. Also excludes heat, light, water, telephone, office and garage equipment and supplies, office and garage rental.

[2] Costs directly chargeable to individual vehicles which vary directly with vehicle miles traveled and tonnage hauled.

[3] Costs directly chargeable to individual vehicles which do not vary with vehicle miles traveled and tonnage hauled.

Direct costs accounted for 79 percent of the total spent by the cooperatives in operating their own trucks in 1963. Both the total annual cost per truck unit for all types of repairs and the total cost per delivered ton varied considerably among the cooperatives.

Direct Costs

The importance of direct costs is shown in table 5, and the relationship of each item to the total cost. Of all the expenses, drivers' wages (including fringe benefits) were the most important single item, totaling about $727,000, and representing $1.36 per delivered ton, or 47 percent of all costs. Fuel, oil, and grease make up the second largest expense, accounting for about $223,000, or slightly more than 18 percent of the direct costs.

The third largest expense was for vehicle repairs: more than $200,000, or 14 percent of the total cost. A breakdown of repairs made to the chassis and to the body was not possible because of the methods used for reporting these costs to the accounting office. Tires, tubes, including their repair, and miscellaneous expenses amounted to 4 percent of the direct costs.

Table 5.--Total direct cost by individual items, 7 cooperatives, 1963

Item	Total	Costs		
		Per ton	Per mile	Percentage of total
	Dollars	Cents	Cents	Percent
Drivers' wages [1]	726,752	136	22.4	47
Fuel, oil, & grease	222,611	42	6.9	14
Vehicle repairs & parts [2]	208,246	39	6.4	14
Tires & tubes (including repairs)	48,787	9	1.5	3
All other	11,228	2	.4	1
Total	1,217,624	228	37.6	79

[1] Includes social security, workmen's compensation taxes and insurance, and other fringe benefits.

[2] Includes repairs to chassis, body, and unloading systems in own and other shops; and parts, labor, road service, washing, painting, and antifreeze.

Six of the 7 cooperatives in the study operated garages. These cooperatives operated 101, or 92 percent, of the 110 trucks in the study (table 6). Five of these owned 82 bulk trucks and their garages did 50 percent or more of their major repair work.

Five of the cooperatives' garages were centrally located in the area they served. The area served by one cooperative was divided into regions, with a garage centrally located in each. However, management personnel at bulk-feed distribution points in the region were not compelled to have all their work done at the garage.

Management personnel responsible for the supervision of bulk-feed trucks at 10 distribution points operated by the 7 cooperatives provided opinions on their garage arrangements. The study indicated that 6 were in favor of operating their own garage and 4 were not.

Table 6.--Percentage of major truck repair work done in own garages, 6 cooperatives, 1963

Percentage of major repairs in own garages	Number of cooperatives	Number of trucks operated
0 - 24	0	0
25 - 49	1	19
50 - 74	2	49
75 - 100	3	33
Total	6	101

Overhead Costs

Truck depreciation amounted to more than one-half of the total overhead costs (table 7). The second item was taxes, licenses, and permits at a cost of 14 cents per delivered ton, or 5 percent of the total cost. Insurance and interest on truck net investment each accounted for 2 percent.

Generally, interest on investment in trucks was not included as part of the truck operating costs by the cooperatives studied. This rate was computed at the rate each cooperative was currently paying on borrowed capital for such an investment. This rate was then applied to net book value and the amount obtained added to the truck operating costs.

Effect of Annual Tonnage and Mileage on Operating Costs

Average tons delivered per trip is a simple measure of the efficiency of moving bulk feed from depot or mill to patrons' storage bins. This study indicates that this average is closely related to cost per delivered ton.

Table 7.--Total overhead costs by individual items, 7 cooperatives, 1963

Item	Costs			
	Total	Per ton	Per mile	Percentage of total
	Dollars	Cents	Cents	Percent
Depreciation of trucks [1]	189,388	35	5.8	12
Taxes, licenses & permits [2]	74,559	14	2.3	5
Insurance	35,597	7	1.1	2
Interest on truck investment [3]	28,044	5	.9	2
Total	327,588	61	10.1	21

[1] Does not include depreciation of garage or shop tools and equipment.
[2] Includes registration fees of new units.
[3] Computed on net book value of equipment at the current rate paid on borrowed capital.

Table 8 indicates these cooperative trucks delivered an average of almost 9 tons of bulk feed per trip. Two of the cooperatives were within a half ton (.4) of having capacity loads on every trip. The significant difference in their cost per delivered ton may be explained by the average round trip distance. One association had the lowest cost of $2.46 a ton with average round trips of 49 miles, while the other had the highest of $5.24 with round trips that averaged 187 miles.

As an alternative, the delivery charge could have been reduced to $2.46 per ton, resulting in a saving of 43 cents per ton.

Some factors that determine the size of payload and the number of miles traveled are: unsurfaced roads, hilly terrain, bridge and highway weight restrictions, and the condition of farm lanes in the winter or during the spring thawing season which may reduce the size of loads that can be delivered to a farm.

Table 8.--Relationship of volume of feed hauled, miles operated, and motortruck utilization to costs of operation, 7 cooperatives, 1963

Cooperative	Average per truck		Truck capacity			Average truck operating cost		Average round trip
	Quantity delivered	Distance driven	Average available	Average delivered per trip	Difference	Per delivered ton	Per truck mile	
	Tons	Miles	Tons	Tons	Tons	Dollars	Cents	Miles
B	4,990	10,400	12.6	9.5	-3.1	2.82	135	20
D	3,993	18,781	10.2	5.6	-4.6	2.59	55	26
A	3,934	17,783	11.2	10.8	- .4	2.46	54	49
E	4,671	36,915	12.1	7.1	-5.0	3.58	45	56
F	6,991	42,251	11.2	10.0	-1.2	2.66	44	60
G	2,224	36,492	11.8	11.4	- .4	5.24	32	187
C	2,133	32,220	11.5	5.4	-6.1	4.36	29	82
All	4,867	29,452	11.2	8.6	-2.6	2.89	48	52

By delivering an average of 8.6 tons of bulk feed out of a possible 11.2 tons per trip, these cooperatives achieved about 77-percent-capacity utilization. Increasing utilization of truck capacity results in operational efficiency which can be reflected in lower delivery costs.

For example, if these trucks delivered an average of 10.0 tons of feed per trip, an increase of 1.4 tons, capacity utilization would have been increased by 13 percent, or to a total of 90 percent. A delivery charge of $2.89 would have produced $1.8 million, an increase of $265,585 in annual revenue for the same service.

An important factor in the "turnaround time" of bulk-feed delivery trucks is the number and location of bulk-feed-storage bins on the farmstead. Most bulk trucks must be close to the bins to make proper connections, as the chutes, hoses, or conveyors often are short, and restrict the parking position.

Generally, those factors that determine size of load also influence the number of miles traveled as well as the number of trips. Such factors also affect the operating expenses and useful life of the trucks.

A cooperative delivering near-capacity loads over short distances will have a high per-mile cost and a correspondingly low delivered

This truck will have to be moved to fill bins numbered 2, 3, 4, and 5--shown in left background.

ton cost, while as round trip distance increases, truck cost per mile decreases and cost per ton of feed increases (fig. 1).

Cost per Delivered Ton by Round Trip Distance and Size of Load

Table 9 shows that bulk-feed delivery costs per ton ranged from $2.41 for loads of 11½ tons and over, delivered 40 to 60 miles, to a high of $7.09 for loads between 5½ to 8½ tons delivered 80 miles or more.

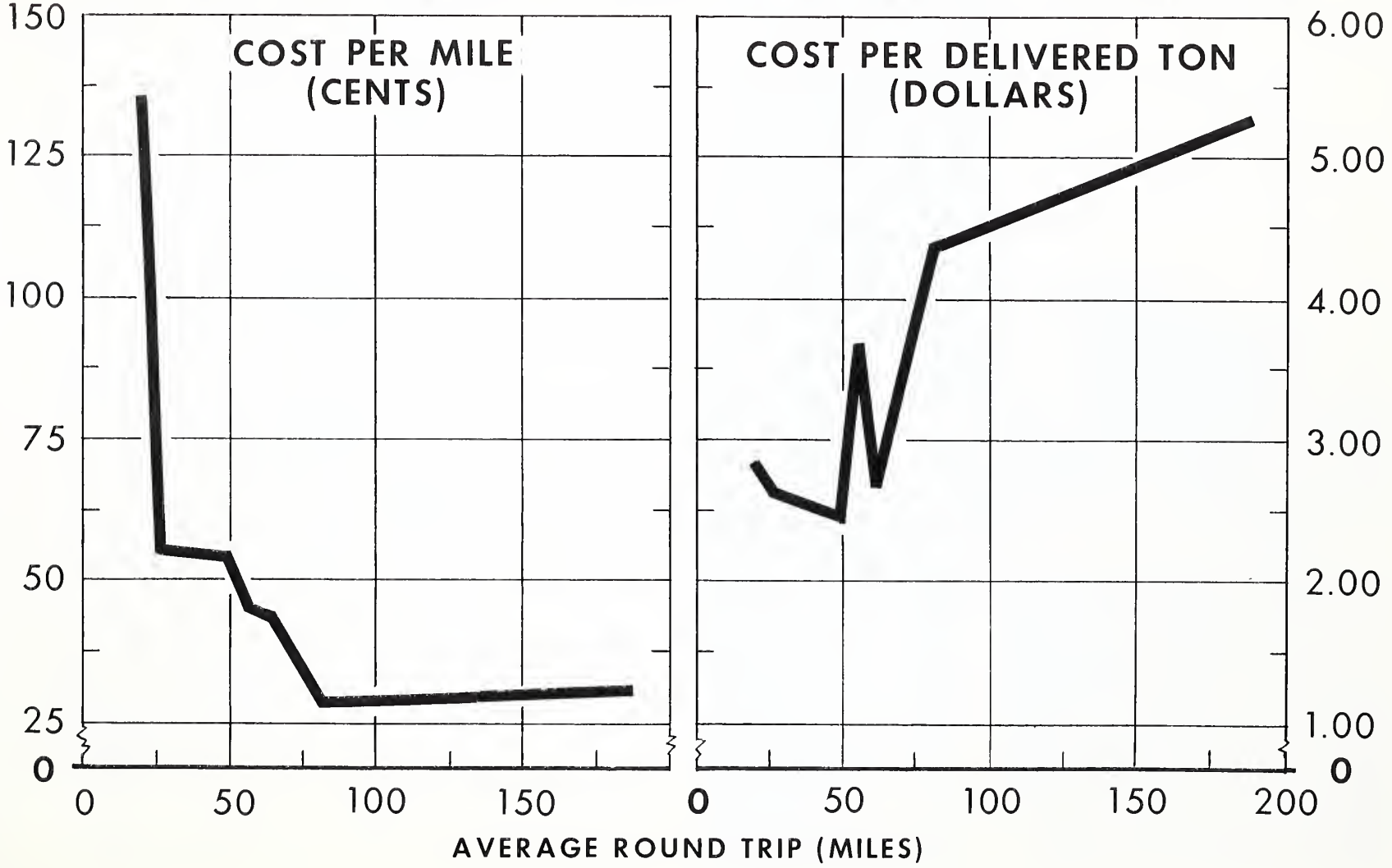
It should be noted that the average-size load delivered was slightly more than 8½ tons at an average cost per delivered ton of $2.89 for a round trip of 52 miles.

Total cost per ton rises as the miles per ton increases; however, as capacity utilization increases, cost per ton decreases.

Table 9.--Motortruck operating cost for a delivered ton of bulk feed by round trip distance and load size, 17 distribution points, 1963

Average miles per round trip	Average cost per delivered ton for load of--			
	5.5 tons & under	5.51 to 8.5 tons	8.51 to 11.5 tons	Over 11.5 tons
	Dollars			
Under 20	3.45	--	2.82	--
20-39.9	4.21	2.39	--	--
40-59.9	6.73	3.35	2.55	2.41
60-79.9	--	2.64	2.66	--
80 and over	--	7.09	6.34	4.31

Fig. 1- COMPARISON OF BULK-FEED TRUCK-OPERATING COSTS PER MILE AND PER DELIVERED TON, 7 COOPERATIVES, 1963



Distribution of Cooperatives According to Average Costs per Delivered Ton and Size of Truck Fleet

As cost per delivered ton is a more meaningful figure and is used more frequently for comparisons, distribution of the 7 participating cooperatives' per-ton costs for delivering feed are shown in table 10. Three cooperatives' delivery costs averaged between $2.50 and $3 per ton. Another cooperative had costs averaging less than $2.50, and the 3 remaining cooperatives had costs averaging more than $3.50. Generally, the cooperatives with average costs above $3.50 may attribute the higher costs to low utilization of truck capacity or making long trips with relatively small amounts of feed. Compare table 10 with table 8.

The 4 cooperatives with average costs below $3 operated slightly more than 75 percent of the trucks. Truck fleets operated by the 7 cooperatives ranged in size from 8 to 37 trucks, with an overall average of 16 trucks.

Table 10.--Distribution of 7 cooperatives' average costs per delivered ton of feed and size of truck fleet, 1963

Delivery cost (Dollars) per ton of feed	Number of cooperatives	Trucks operated	
		Total	Average per cooperative
Under 2.50	1	12	12
2.50 to 2.99	3	71	24
3.00 to 3.99	1	8	8
4.00 to 4.99	1	9	9
5.00 and over	1	10	10
Total	7	110	16

Bulk-Feed Delivery-Truck Operations

Detailed statistics were obtained from 7 regional cooperatives operating 110 trucks at 17 distribution points. Data shown in table 11 illustrates the scope of this information.

Table 11.--Bulk-feed truck operating statistics, 7 cooperatives, 1963

Item	Number
Total trucks operated	110
Total tons hauled	535,391
Average tons delivered per trip	8.6
Average annual tons delivered per truck	4,867
Total miles operated	3,239,767
Average annual miles per truck	29,452
Average length of round trip (miles)	52
Average age of trucks (months)	48
Average capacity of trucks (tons)	11.2
Average miles per gallon of fuel	4.3
Average stopoffs per trip	1.4

Capacity utilization was good, as the participants delivered an average of almost 9 tons, with trucks having an average capacity of slightly more than 11 tons. The relatively low average-miles-per-gallon of fuel is probably due to using the engine as a source of power when unloading feed.

Average Length of Trip

The distribution of 7 cooperatives according to average length of round trip taken by their trucks in 1963 is shown in table 12. Four of these cooperatives had round trips that averaged less than 59 miles. Only one cooperative averaged 100 or more miles per trip.

The average round trip was under 80 miles for 83 percent of the trucks operated by the 7 cooperatives.

Table 12.--Distribution of 7 cooperatives according to average round trip truck distance, 1963

Average number of miles per round trip	Number of cooperatives	Trucks operated	
		Number	Percent of total
Under 20	1	15	14
20-39	1	19	17
40-59	2	20	18
60-79	1	37	34
80-99	1	9	8
100 and above	1	10	9
Total	7	110	100

Backhauls

Only 5 of the 17 distribution points at which the 7 cooperatives had bulk-feed trucks had any return loads. As shown in table 13, these 5 distribution points had backhauls for only 518, or 8 percent of the 6,469 trips made in 1963. Their backhaul tonnage was 4,078 tons, and had this been included in the total tons transported, it would have amounted to .8 percent of the total.

Lime, fertilizer, and feed ingredients accounted for 89 percent of the backhaul trips, and soybean meal for the remaining 11 percent.

Backhauls are limited because of the specialized characteristics of the equipment. However, efforts might be made to develop backhauls for commodities that can be transported in the unit, but they should not be handled at the expense of efficient feed distribution.

Time Required to Load and Unload Bulk-Feed Trucks

Time required to load and unload trucks, as reported by the 7 cooperatives, varied from 1 to 3 minutes to load a ton of feed, depending on the kind of feed (dairy, poultry, pellets, or mash), and the type of loading system used. Kind of feed and type of unloading equipment on the truck (auger, mechanical, or combination) affect the time required to unload. Other factors that influence the unloading operation are:

1. Length and height of pipe or chute to the farmer's bulk bin.

Table 13.--Number and percent of total trips for which backhauls were available at 5 distribution points, by products backhauled, 1963

Product	Backhauls				Total trips
	Tons	Number	Percentage of total trips	Percentage of backhaul trips	
Lime, fertilizer, and feed ingredients	3,000	461	7.1	89	5,300
Soybean meal	1,078	57	0.9	11	1,196
Total	4,078	518	8.0	100	6,496

2. Number of times the delivery unit has to be moved to different bins being filled on the farm.

Minimum-Size Bulk Feed Orders

Cooperatives in the study reported that at 7 of the 17 distribution points, policy required a minimum order of 2 tons of bulk feed, or the patron would be charged a premium for delivery. At 5 distribution points, minimum orders of 3 tons were required. At 2 distribution points, minimum orders of 4 tons were required, and at 3 distribution points, a minimum order of 1 ton was required. Size of order and delivery distance frequently determines the delivery charge.

Generally, if a patron within a predetermined radius ordered a full load of feed he would qualify for a quantity discount or a reduction in the delivery charge.

General Problems of Delivering Feed

The most frequently mentioned problem in delivering bulk feed that management personnel reported at the 17 feed distribution points of the 7 cooperatives was low-hanging powerlines, (table 14). Aside from the damage and the cost of repairs, it presents a personal safety problem as well as a fire hazard. Generally, accidents as a result of this problem were mentioned as occurring with greater frequency during the winter.

The second most mentioned problem was temporary highway weight embargoes. In many parts of the country, there is a period in early spring "when the frost goes out" during which road restrictions or prudence will confine these trucks to hard-surfaced roads.

The third most frequently mentioned problem was narrow farm lanes. During the spring and winter months, particularly, rain and snow cause road surfaces to become slippery and hazardous.

Table 14.--Problems encountered in making bulk feed deliveries to patrons, in bulk trucks, as reported at 17 distribution points, 1963

Problems encountered by drivers	Number of times reported
Low-hanging power lines	10
Temporary highway embargoes on weight [1]	7
Narrow farm lanes	5
Poor unloading facilities	1

[1] Due to thawing, ice, or snow.

If feed is delivered in large trucks, room to maneuver them into unloading positions must be provided. Obstructions such as narrow passages between buildings, trees, conveyors, or arches, and overhead wires must be considered. The lane from main road to feed bin must be able to support the truck in any weather.

Management personnel at the 17 distribution points stated that excess feed which the patron's bins cannot hold was handled in 1 of 2 ways: (1) At 6 of the distribution points excess feed is bagged, or put in barrels or feed bunkers; (2) At 6 other points the truck returns to the depot where the feed is weighed and the patron's account credited for that amount. No problems with excess delivered feed were indicated at the five other distribution points.

Recommendations

Based on information developed in this study, several recommendations are made here on selecting bulk feed trucks, maintaining operating records, and truck dispatching for consideration by management personnel.

Selecting Bulk-Feed Trucks

Management personnel responsible for supervision of bulk-feed trucks operated by 7 cooperatives listed a number of advantages and disadvantages of various types

of bulk-feed trucks and their unloading systems. Based on these comparisons, the following list of features might be considered when selecting bulk-feed trucks:

Truck features

- Tare weight should be held to minimum.
- Loading hatches should be watertight.
- Hatches should be large enough to enter for inspection, cleaning, and repair.
- Secure footing on top should be provided.
- Pipe, chute, or hoses must be of sufficient length to reach patrons' bins.

Unloading system

- Should not damage pellets.
- Should discharge feed at a reasonably fast rate.
- Should require a minimum of maintenance.

Truck and body should be carefully matched to insure maximum payloads, require minimum maintenance to reduce downtime, speed up deliveries, and assure dependable service.

A cooperative in the Northwest has this modern efficient bulk-feed truck in service.

Need for Operating Records on Individual Trucks

The trend toward larger delivery units has created widespread interest in the mechanics and economics of bulk feed distribution by farmer cooperatives.

Efficient and economical operation of bulk feed trucks is essential to provide adequate service at low cost to members and patrons. A system of recording operating costs and adequately measuring performance of such trucks is necessary.

There would be advantages in keeping operating records on an individual truck basis, permitting measurement of efficiency and productivity of each unit. This would aid management in minimizing costs, increasing overall efficiency of the fleet, and helping to establish a more equitable schedule of rates for delivering bulk feed.

Systematic Dispatching of Trucks

The systematic dispatching of bulk feed delivery trucks is important for maximizing truck utilization and efficient scheduling of deliveries. More attention needs to be given to consolidating orders and providing regular service over established routes in order to maximize productive employment of trucks.

Appendix

Table 15.--Capacity and number of bulk-feed trucks operated by 7 cooperatives, by type of body, discharge system, and average age, 1963

Body type and Discharge system	Manufacturers' rated capacity of trucks (tons)														Total	Average age
	Size group 6-9				Size group 10-12			Size group 12 1/2-21								
	6	8	8 1/2	9	10	11	12	12 1/2	13	14	15	18	19	21		
	Number															Months
Tank:																
Belt to air	0	1	0	2	2	0	7	0	0	0	0	0	0	0	12	52
Auger to air	0	0	0	0	8	3	9	0	0	0	1	4	0	0	25	68
Auger to auger	3	0	0	0	0	0	3	0	0	0	0	0	2	0	8	25
Mech.[1] to air	0	0	0	0	0	0	6	1	1	0	0	0	0	2	10	36
All mechanical	3	0	0	0	16	1	7	0	0	7	0	0	0	0	34	54
Mech. to mech. air	0	0	0	0	0	0	5	0	0	1	0	0	0	0	6	23
Total tank	6	1	0	2	26	4	37	1	1	8	1	4	2	2	95	--
Total--by size groups	9				67			19							95	
Open top-tilt bed:[2]																
Air	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	19
Auger to air	0	0	1	8	2	0	1	0	0	0	0	0	0	0	12	32
Total open top	0	0	1	8	2	3	1	0	0	0	0	0	0	0	15	
Total--by size groups	9				6			0							15	--
Grand total	6	1	1	10	28	7	38	1	1	8	1	4	2	2	110	
Grand total--by size groups	18				73			19							110	
Average age in months	36	68	15	40	71	35	45	44	46	13	39	92	18	5	--	48

[1] Mechanical discharge system includes drag-chain and paddle type.
[2] Canvas-covered.

Table 16.--Bulk-feed truck-operating costs and statistics, 7 regional cooperatives, 1963 [1]

Item	Costs				
	Total	Per ton	Per mile	Percentage of total	Percentage of group
	Dollars	Cents	Cents	Percent	Percent
Overhead:					
Depreciation of trucks	189,388	35	5.8	12	58
Taxes, licenses, & permits [2]	74,559	14	2.3	5	23
Insurance	35,597	7	1.1	2	11
Interest on investment	28,044	5	.9	2	8
Total	327,588	61	10.1	21	100
Direct:					
Drivers' wages [3]	726,752	136	22.4	47	60
Fuel, oil, & grease	222,611	42	6.9	14	18
Vehicle repairs & parts [4]	208,246	39	6.4	14	17
Tires & tubes (including repairs)	48,787	9	1.5	3	4
All other	11,228	2	.4	1	1
Total	1,217,624	228	37.6	79	100
Grand total	1,545,212	289	47.7	100	--
	Number				
Trucks operated	110				
Annual tons hauled	535,391				
Average tons delivered per trip	8.6				
Total miles operated	3,239,767				
Average annual miles per truck	29,452				
Average length of round trip (miles)	51.8				
Average age of trucks (months)	48.0				
Average capacity of trucks (tons)	11.2				
Average miles per gallon	4.3				
Average stopoffs per trip	1.4				

[1] Does not include indirect or administrative costs for management, such as time spent in general administration of trucking operations. Also excludes heat, light, water, telephone, office and garage equipment and supplies, office and garage rental.

[2] Includes registration fees of any new units.

[3] Includes social security, workmens' compensation taxes and insurance, and other fringe benefits.

[4] Includes all costs for own shop, other shops, parts and labor, road services, washing, painting, and anti-freeze.

Table 17.--Bulk-feed truck-operating costs and statistics, regional cooperative A, 1963[1]

Item	Costs				
	Total	Per ton	Per mile	Percentage of total	Percentage of group
	Dollars	Cents	Cents	Percent	Percent
Overhead:					
Depreciation of trucks	17,460	37	8.2	15	58
Interest on investment	4,904	11	2.3	4	16
Taxes, licenses, & permits[2]	4,763	10	2.2	4	16
Insurance	2,821	6	1.3	3	10
Total	29,948	64	14.0	26	100
Direct:					
Drivers' wages[3]	50,029	106	23.5	43	58
Fuel, oil, & grease	16,590	35	7.8	14	20
Vehicle repairs & parts[4]	15,689	33	7.4	14	18
Tires & tubes (including repairs)	3,568	8	1.7	3	4
All other	174	([5])	([5])	([6])	([6])
Total	86,050	182	40.4	74	100
Grand total	115,998	246	54.4	100	--
	Number				
Trucks operated	12				
Annual tons hauled	47,202				
Average tons delivered per trip	10.8				
Total miles operated	213,401				
Average annual miles per truck	17,783				
Average length of round trip (miles)	48.7				
Average age of trucks (months)	48.3				
Average capacity of trucks (tons)	11.2				
Average miles per gallon	5.3				
Average stopoffs per trip	1.5				

[1]Does not include indirect or administrative costs for management, such as time spent in general administration of trucking operations. Also excludes heat, light, water, telephone, office and garage equipment and supplies, office and garage rental.

[2]Includes registration fees of any new units.

[3]Includes social security, workmens' compensation taxes and insurance, and other fringe benefits.

[4]Includes all costs for own shop, other shops, parts and labor, road services, washing, painting and anti-freeze.

[5]Less than one-half of 1 cent.

[6]Less than one-half of 1 percent.

Table 18.--Bulk-feed truck-operating costs and statistics, regional cooperative B, 1963 [1]

Item	Costs				
	Total	Per ton	Per mile	Percentage of total	Percentage of group
	Dollars	Cents	Cents	Percent	Percent
Overhead:					
Depreciation of trucks	26,368	35	16.9	12	63
Insurance	8,095	11	5.2	4	19
Taxes, licenses, & permits [2]	6,154	8	3.9	3	15
Interest on investment	1,054	1	.7	([5])	3
Total	41,671	55	26.7	19	100
Direct:					
Drivers' wages [3]	105,220	141	67.4	50	62
Vehicle repairs & parts [4]	28,881	39	18.5	14	17
Fuel, oil, & grease	24,449	33	15.7	12	15
Tires & tubes (including repairs)	8,535	11	5.5	4	5
All other	2,269	3	1.5	1	1
Total	169,354	227	108.6	81	100
Grand total	211,025	282	135.3	100	--
			Number		
Trucks operated			15		
Annual tons hauled			74,852		
Average tons delivered per trip			9.5		
Total miles operated			156,000		
Average annual miles per truck			10,400		
Average length of round trip (miles)			19.9		
Average age of trucks (months)			86.7		
Average capacity of trucks (tons)			12.6		
Average miles per gallon			1.6		
Average stopoffs per trip			5.0		

[1] Does not include indirect or administrative costs for management, such as time spent in general administration of trucking operations. Also excludes heat, light, water, telephone, office and garage equipment and supplies, office and garage rental.

[2] Includes registration fees of any new units.

[3] Includes social security, workmens' compensation taxes and insurance, and other fringe benefits.

[4] Includes all costs for own shop, other shops, parts and labor, road services, washing, painting, and antifreeze.

[5] Less than one-half of 1 percent.

Table 19.--Bulk-feed truck-operating costs and statistics, regional cooperative C, 1963[1]

Item	Costs				
	Total	Per ton	Per mile	Percentage of total	Percentage of group
	Dollars	Cents	Cents	Percent	Percent
Overhead:					
Depreciation of trucks	16,754	87	5.8	20	67
Insurance	3,096	16	1.1	4	12
Interest on investment	2,682	14	.9	3	11
Taxes, licenses, & permits[2]	2,562	13	.9	3	10
Total	25,094	130	8.7	30	100
Direct:					
Drivers' wages[3]	26,403	138	9.1	32	45
Fuel, oil, & grease	20,483	107	7.0	24	35
Tires & tubes (including repairs)	6,022	31	2.1	7	10
Vehicles repairs & parts[4]	5,509	29	1.9	7	10
All other	221	1	.1	(5)	(5)
Total	58,638	306	20.2	70	100
Grand total	83,732	436	28.9	100	--
	Number				
Trucks operated	9				
Annual tons hauled	19,193				
Average tons delivered per trip	5.4				
Total miles operated	289,984				
Average annual miles per truck	32,220				
Average length of round trip (miles)	81.6				
Average age of trucks (months)	32.6				
Average capacity of trucks (tons)	11.5				
Average miles per gallon	5.5				
Average stopoffs per trip	1.5				

[1] Does not include indirect or administrative costs for management, such as time spent in general administration of trucking operations. Also excludes heat, light, water, telephone, office and garage equipment and supplies, office and garage rental.

[2] Includes registration fees of any new units.

[3] Includes social security, workmens' compensation taxes and insurance, and other fringe benefits.

[4] Includes all costs for own shop, other shops, parts and labor, road services, washing, painting, and anti-freeze.

[5] Less than one-half of 1 percent.

Table 20.--Bulk-feed truck-operating costs and statistics, regional cooperative D, 1963 [1]

Item	Costs				
	Total	Per ton	Per mile	Percentage of total	Percentage of group
	Dollars	Cents	Cents	Percent	Percent
Overhead:					
Depreciation of trucks	36,064	48	10.1	18	75
Taxes, licenses & permits [2]	4,845	6	1.4	3	10
Interest on investment	4,084	5	1.1	2	8
Insurance	3,324	4	.9	2	7
Total	48,317	63	13.5	25	100
Direct:					
Drivers' wages [3]	97,015	128	27.2	49	65
Fuel, oil, & grease	24,918	33	7.0	13	17
Vehicle repairs & parts [4]	21,911	29	6.1	11	15
Tires & tubes (including repairs)	3,236	4	.9	1	2
All other	1,291	2	.4	1	1
Total	148,371	196	41.6	75	100
Grand total	196,688	259	55.1	100	--
	Number				
Trucks operated	19				
Annual tons hauled	75,871				
Average tons delivered per trip	5.6				
Total miles operated	356,838				
Average annual miles per truck	18,781				
Average length of round trip (miles)	26.4				
Average age of trucks (months)	35.7				
Average capacity of trucks (tons)	10.2				
Average miles per gallon	3.7				
Average stopoffs per trip	1.3				

[1] Does not include indirect or administrative costs for management, such as time spent in general administration of trucking operation. Also excludes heat, light, water, telephone, office and garage equipment and supplies, office and garage rental.

[2] Includes registration fees of any new units.

[3] Includes social security, workmens' compensation taxes and insurance, and other fringe benefits.

[4] Includes all costs for own shop, other shops, parts and labor, road services, washing, painting, and antifreeze.

Table 21.--Bulk-feed truck-operating costs and statistics, regional cooperative E, 1963[1]

Item	Costs				
	Total	Per ton	Per mile	Percentage of total	Percentage of group
	Dollars	Cents	Cents	Percent	Percent
Overhead:					
Depreciation of trucks	9,205	25	3.1	7	43
Taxes, licenses, & permits[2]	8,254	22	2.8	6	39
Insurance	2,352	6	.8	2	11
Interest on investment	1,481	4	.5	1	7
Total	21,292	57	7.2	16	100
Direct:					
Drivers' wages[3]	64,824	173	22.0	48	58
Vehicle repairs & parts[4]	21,689	58	7.3	16	19
Fuel, oil, & grease	21,244	57	7.2	16	19
Tires & tubes (including repairs)	4,717	13	1.6	4	4
All other	--	--	--	--	--
Total	112,474	301	38.1	84	100
Grand total	133,766	358	45.3	100	
	Number				
Trucks operated	8				
Annual tons hauled	37,369				
Average tons delivered per trip	7.1				
Total miles operated	295,320				
Average annual miles per truck	36,915				
Average length of round trip (miles)	55.9				
Average age of trucks (months)	83.8				
Average capacity of trucks (tons)	12.1				
Average miles per gallon	3.8				
Average stopoffs per trip	1.5				

[1]Does not include indirect or administrative costs for management, such as time spent in general administration of trucking operations. Also excludes heat, light, water, telephone, office and garage equipment and supplies, office and garage rental.

[2]Includes registration fees of any new units.

[3]Includes social security, workmens' compensation taxes and insurance, and other fringe benefits.

[4]Includes all costs for own shop, other shops, parts and labor, road services, washing, painting, and antifreeze.

Table 22.--Bulk-feed truck-operating costs and statistics, regional cooperative F, 1963 [1]

Item	Costs				
	Total	Per ton	Per mile	Percentage of total	Percentage of group
	Dollars	Cents	Cents	Percent	Percent
Overhead:					
Depreciation of trucks	67,526	26	4.3	10	50
Taxes, licenses, & permits [2]	42,801	17	2.7	6	32
Insurance	14,070	5	.9	2	10
Interest on investment	10,172	4	.7	2	8
Total	134,569	52	8.6	20	100
Direct:					
Drivers' wages [3]	338,136	131	21.6	49	61
Fuel, oil, & grease	99,541	38	6.4	15	18
Vehicle repairs & parts [4]	92,056	36	5.9	13	17
Tires & tubes (including repairs)	15,951	6	1.0	2	3
All other	7,273	3	.5	1	1
Total	552,957	214	35.4	80	100
Grand total	687,526	266	44.0	100	--
	Number				
Trucks operated	37				
Annual tons hauled	258,660				
Average tons delivered per trip	10.0				
Total miles operated	1,563,300				
Average annual miles per truck	42,251				
Average length of round trip (miles)	60.2				
Average age of trucks (months)	42.7				
Average capacity of trucks (tons)	11.2				
Average miles per gallon	5.0				
Average stopoffs per trip	1.6				

[1] Does not include indirect or administrative costs for management, such as time spent in general administration of trucking operations. Also excludes heat, light, water, telephone, office and garage equipment and supplies, office and garage rental.

[2] Includes registration fees of any new units.

[3] Includes social security, workmens' compensation taxes and insurance, and other fringe benefits.

[4] Includes all costs for own shop, other shops, parts and labor, road services, washing, painting, and antifreeze.

Table 23.--Bulk-feed truck-operating costs and statistics, regional cooperative G, 1963 [1]

Item	Costs				
	Total	Per ton	Per mile	Percentage of total	Percentage of group
	Dollars	Cents	Cents	Percent	Percent
Overhead:					
Depreciation of trucks	16,011	72	4.4	14	60
Taxes, licenses, & permits [2]	5,180	23	1.4	4	19
Interest on investment	3,667	17	1.0	3	14
Insurance	1,839	8	.5	2	7
Total	26,697	120	7.3	23	100
Direct:					
Drivers' wages [3]	45,125	203	12.4	39	50
Vehicle repairs & parts [4]	22,511	101	6.2	19	25
Fuel, oil, & grease	15,386	69	4.2	13	17
Tires & tubes (including repairs)	6,758	31	1.8	6	8
All other	--	--	--	--	--
Total	89,780	404	24.6	77	100
Grand total	116,477	524	31.9	100	
	Number				
Trucks operated	10				
Annual tons hauled	22,244				
Average tons delivered per trip	11.4				
Total miles operated	364,924				
Average annual miles per truck	36,492				
Average length of round trip (miles)	187.2				
Average age of trucks (months)	23.9				
Average capacity of trucks (tons)	11.8				
Average miles per gallon	4.8				
Average stopoffs per trip	1.0				

[1] Does not include indirect or administrative costs for management, such as time spent in general administration of trucking operations. Also excludes heat, light, water, telephone, office and garage equipment and supplies, office and garage rental.

[2] Includes registration fees of any new units.

[3] Includes social security, workmens' compensation taxes and insurance, and other fringe benefits.

[4] Includes all costs for own shop, other shops, parts and labor, road services, washing, painting, and antifreeze.

Other Publications Available

Motortruck Operating Costs of Farmer Cooperatives, General Report 121. Thomas H. Camp

Motortruck Operations of Farmer Cooperatives, General Report 109. William C. Bowser, Jr.

Piggyback Transportation for Pacific Northwest Cooperatives, General Report 86. William C. Bowser, Jr.

Losses of Livestock in Transit in Midwestern and Western States, Marketing Research Report 247. Joseph E. Rickenbacker

Safety-Checking Handling Practices to Reduce Livestock Losses, Information 45. Joseph E. Rickenbacker

Safety-Checking Livestock Trucking to Reduce Loss and Damage, Information 33. Joseph E. Rickenbacker

Safety-Checking Handling Facilities to Reduce Livestock Losses, Information 28. Joseph E. Rickenbacker

Motortruck Leasing by Farmer Cooperatives, Information 14. William C. Bowser, Jr.

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